

Chapter 4 ADJUSTMENT

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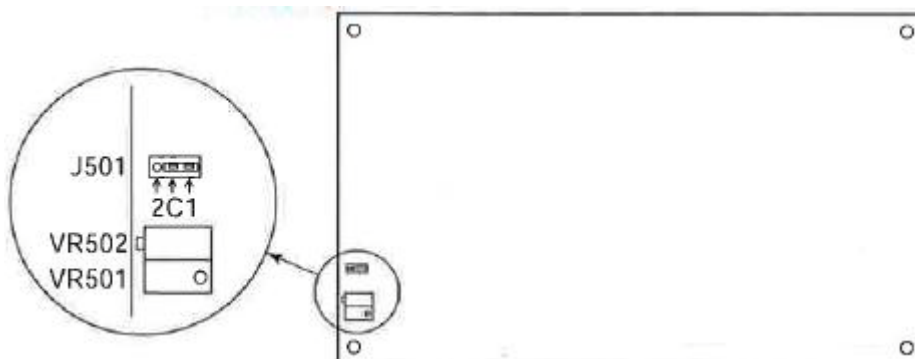
Chapter 4 ADJUSTMENT

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4.1 PRESSURE ADJUSTMENT

4.1.1 Adjustment of Pressure Detector Circuit

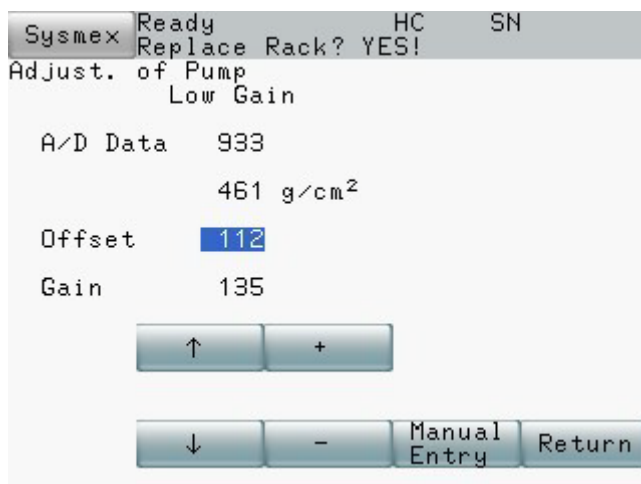
- (1) Verify that the ambient temperature where the unit is located is within the range of 15°C - 35°C. (The optimum recommended temperature range is 20°C - 30°C.)
- (2) Prepare the Pressure Gauge (which can measure the pressure of 60kPa) .
- (3) Adjustment procedure:
 - 1) Turn the power OFF. Remove the rear panel and the memory card cover under the HOST connector.
 - 2) Connect J501 Jumper of PCB NO.60020 to C-2.
 - 3) Loosen and remove the rinse bottle cap carefully because the cap will be lifted up by the pressure inside the rinse bottle.
 - 4) Disconnect the black marked silicone tube connected to the rear panel at the rinse bottle side.
 - 5) Connect the pressure gauge to the silicone tube.
 - 6) Turn the power ON.
 - 7) Adjust the VR502 (OFFSET) so that the pressure becomes 30.8kPa. (The pressure will be increased when VR is turned to CW direction. Disconnect the pressure gauge from the tube once when adjusting the pressure decreasing.)
 - 8) Remove Jumper Pin J501. (Do not lose the jumper pin because it is placed on the PC board.)
 - 9) Adjust the VR501 (GAIN) so that the pressure becomes 59.2kPa. (The pressure will be increased when VR is turned to CW direction. Disconnect the pressure gauge from the tube once when adjusting the pressure decreasing.)
 - 10) Verify steps 1) to 9) again. As the VR502 (OFFSET) and the VR501 (GAIN) are related each other, adjust them repeatedly until the set values are obtained by repeating steps 1) to 9).
 - 11) Reconnect Jumper Pin J501 to C-1.
 - 12) Disconnect the silicone tube to decrease pressure, and reconnect it.
 - 13) Verify that pressure is 45.0kPa.
- * If pressure is not 45.0kPa, check and adjust again by repeating steps 1) to 5).



PCBNO.60020 Jumper, VR location

4.1.2 Adjustment of Pressure Indication

- (1) Verify that the ambient temperature where the unit is located is within the range of 15°C ~ 35°C. (The optimum recommended temperature range is 20°C ~ 30°C.)
- (2) Connect the Pressure Gauge to the pressure line (black) on the rear panel.
- (3) Adjustment procedure:
 - 1) Start Service Mode.
 - 2) Select [Special Operate] - [Service] - [Adjust] - [Adjust. of Pump].



- 3) Disconnect the tube at the pressure side (the black marking line on the rear panel) to release the pressure sensor (so that the pressure sensor shows the atmospheric pressure).
- 4) Offset the cursor by using [↑] and [↓] keys.
- 5) Adjust the offset value by using [+] and [-] keys so that the pressure gauge shows 1 g/cm². (When the offset value is lowered, A/D value also becomes lower.) (Actually, there is a fluctuation of 0 ~ 4 for the value, therefore, adjust it so that it shows the value, which approaches to 0 most.)
- 6) Re-connect the pressure gauge to the pressure line on the rear panel.
- 7) Move the cursor to the gain by using [↑][↓] keys.
- 8) Adjust the gain value by using [+] and [-] keys so that the pressure gauge value (adjusted 458 g/cm² by the procedure described in 4.1.1 Adjustment of Pressure Detector Circuit) agrees with the displayed pressure value on CA-600. The difference between the pressure gauge value and CA-600 displayed value should be adjusted within 3 g/cm².
- 9) Verify steps 3) to 8) again, and if the value is within the specified range, fix the value and finish.
- 10) When pressing [Return] key, a screen will appear that can select [Fix][Cancel][Continue] the settings.

NOTE:

Pressure is adjusted at the factory in principle, therefore, it is not necessary to adjust in the field. Setting values are stored in BBURAM on the PCB NO.60020

11) If you update the set value, select [Fix]. To erase the set value and finish, select [Cancel]. To continue adjustment again, select [Continue].

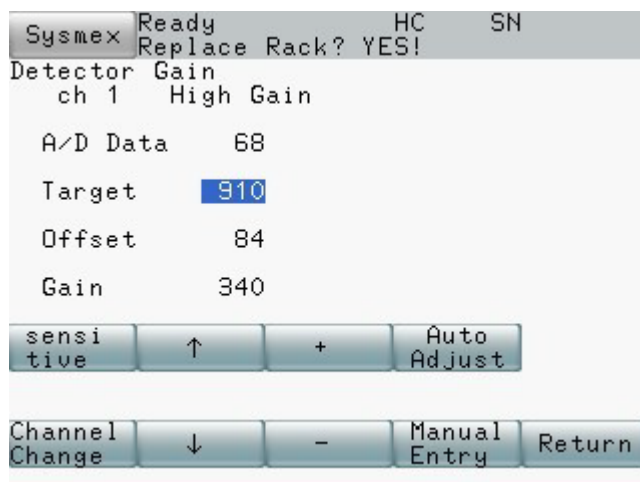
4.2 DETECTOR BLOCK SENSITIVITY ADJUSTMENT

4.2.1 Required Tools for Adjustment

- (1) CA-Series Standard Scattering Stick Set (P/N: 913-1091-3)
- (2) Reaction Tube
- (3) Micro Pipette

4.2.2 Adjustment Screen

- (1) Verify that the ambient temperature where the unit is located is within the range of 15°C - 35°C. (The optimum recommended temperature range is 25°C ± 3°C.)
- (2) Start Service Mode.
- (3) Select [Special Operate] - [Service] - [Adjust] - [Detector Gain].
- (4) The adjustment screen for detector block will be displayed.

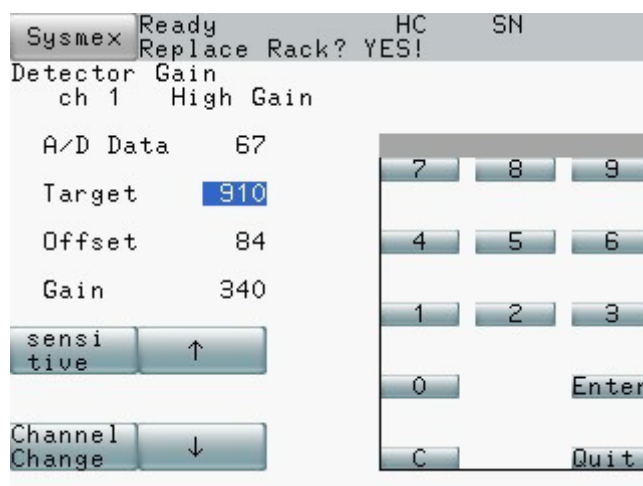


(5) Function of adjustment screen

- 1) A/D Data: Display A/D value in detector block.
- 2) Target: Manually input target value of gain adjustment.
- 3) Offset: Manually input offset adjustment value.
- 4) Gain: Manually input gain adjustment value.
- 5) [Channel Change] key: Select a channel by the order of " CH1 (Detector Well 1) --> CH2 (Detector Well 2) --> CH3 (Detector Well 3) -->CH4 (Detector Well 4) -->CH5 (Detector Well 5) -->CH6 (Detector Well 6)" by pressing [Channel Change] key.
- 6) [Sensitive] key: Alternate the sensitivity of the selected channel in the order of "High Gain"-->" Low Gain"-->" PT Gain".



- 7) [↑][↓] keys: Select Target value, Offset, Gain.
- 8) [+][-] keys: Adjust the selected value.
- 9) [Auto Adjust] key: Perform auto adjust for offset and gain.
- 10) [Manual Entry] key: Enable to manually enter values by numeric keys.



(6) Function of manual entry screen

- 1) Pressing the numeric keys [0] to [9] can set the desirable value directly.
- 2) Pressing [C] key can clear the set value.
- 3) Press [Enter] key to settle the set value. The set value cannot be settled if [Quit] key is pressed without pressing [Enter] key.
- 4) Press [Quit] to return the previous screen.

CAUTION:

- (1) This adjustment should be done more than 30 minutes after the power-ON the instrument.
- (2) Use the scattering stick after being heated for more than 10 minutes in the detector well or the incubation well.
- (3) Close the light shield cover to avoid the influence by the external light during adjustment.
- (4) When Detector Adjustment Error occurs, the channel No. with the error is added to the error message
- (5) Perform adjustment for ch1-ch4 offset by [+][-] so that the A/D value becomes "30"

NOTE:

- (1) Transmitted-light calibration will be performed automatically before the first measurement after switching on the instrument or after 24 hour continuous operation. Transmitted Light calibration checks LED light volume used for a chromogenic or immunoassay parameter, and automatically calibrate if necessary.
- (2) Instruments with new main board (PCB NO.60020) are able to switch on/off LEDs during standby operation and at the start of measurement automatically in order to prolong the life time of the LEDs.

4.2.3 Adjustment of Detector Well for analyzing the scattered light

(1) Offset adjustment for high sensitivity

- 1) Insert the "ebonite stick for adjusting the offset value" in the detector well CH1 to be adjusted.
- 2) Close the light shield cover.
- 3) Select CH1 by using [Channel Change] key, select High Gain , and select [Offset] position by pressing [↑] or [↓]key.
- 4) Press [Auto Adjust] key to start the automatic offset adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times).
- 5) Perform adjustment so that A/D value becomes 30 ± 10 by [+][-] keys.
- 6) Perform Steps 1) to 5) for channels CH2 to CH4.

(2) Gain adjustment for high sensitivity

- 1) Insert the heated "high sensitivity scattering stick" (usually labeled as "750") into the detector well to be adjusted (CH1 to CH4).
- 2) Close the light shield cover.
- 3) Select channel 1 by using [Channel Change] key, select High Gain, and select [Gain] position by pressing[↑][↓]key.
- 4) Press [Auto Adjust] key to start the automatic gain adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times). Confirm that A/D value is ± 20 to the value listed on the scattering stick
- 5) Perform Steps 1) to 5) for channels CH2 to CH4.

(3) Offset adjustment for low sensitivity

- 1) Insert the "ebonite stick for adjusting the offset value" in the detector well CH1 to be adjusted.
- 2) Close the light shield cover.
- 3) Select CH1 by using [Channel Change] key, select Low Gain, and select [Offset] position by pressing [↑] or [↓]key.
- 4) Press [Auto Adjust] key to start the automatic offset adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times).
- 5) Perform adjustment so that A/D value becomes 30 ± 10 by [+][-] keys.
- 6) Change Gain to PT Gain and enter Offset value manually with Low Gain that is performed in Step 3). (Press [+] and [-] keys or [Manual Entry] key to adjust manually.) Change the sensitivity to PT Gain, and confirm that A/D value is the same as PT sensitivity value.
- 7) Perform Steps 1) to 5) for channels CH2 to CH4.

(4) Gain adjustment for low sensitivity

- 1) Insert the heated "low sensitivity scattering stick" (usually labeled as "430") into the detector well to be adjusted (CH1 to CH4).
- 2) Close the light shield cover.
- 3) Select channel 1 by using [Channel Change] key, select Low Gain, and select [Gain] position by pressing [↑][↓] key.
- 4) Press [Auto Adjust] key to start the automatic gain adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times). Confirm that A/D value is ± 15 to the value listed on the scattering stick

- 5) Change the sensitivity to PT Gain, and confirm that A/D value is the same as PT sensitivity value..
- 6) Perform Steps 1) to 5) for channels 2 to 4.

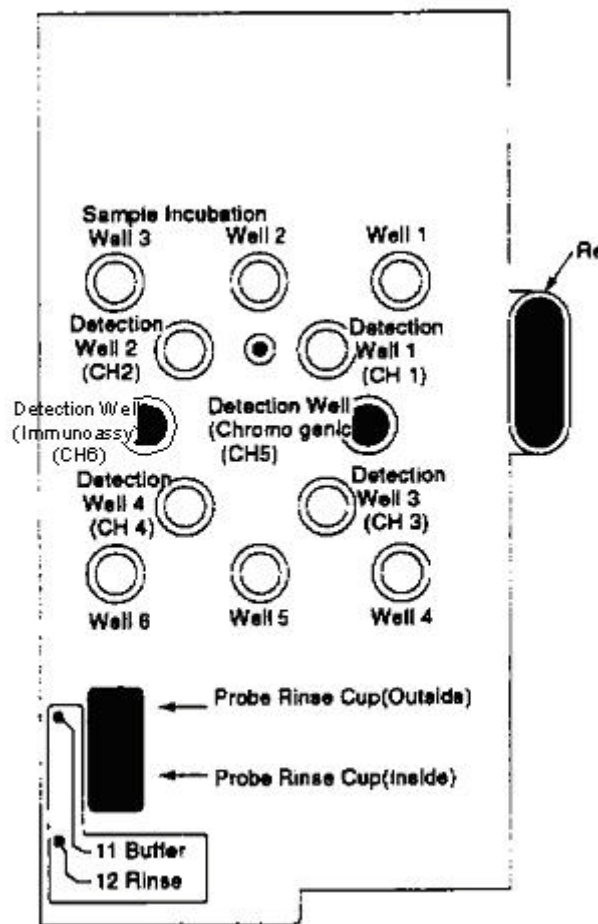
NOTE:

The gain adjustment and the offset adjustment have an influence on each other. Therefore, reconfirm that the set value after each adjustment is within the specified range of values. Refer to 4.2.6 Target Value List for Adjustment

4.2.4 Adjustment of Detector Well for analyzing the transmitted light (Chromogenic and Immunoassy)

(1) Offset adjustment

- 1) Insert the “ebonite stick for adjusting the offset value” in the channel 5 of the detector well.



Detector channel location

- 2) Close the light shield cover.

- 3) Select [CH5] by using [Channel Change] key and select [Offset] position by pressing [↑][↓]key. (Sensitivity is fixed as Low Gain and cannot be changed.)
- 4) Press [Auto Adjust] key to start the automatic offset adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times).
- 5) Adjust A/D value by using [↑][↓] keys so that A/D value approaches to the lowest value the most (value should be 1 and more).
- 6) Perform Steps 1) to 4) for channel 6.

(2) Gain adjustment

- 1) Dispense 200 µL of distilled water or buffer (OV-30) into a reaction tube, and set it into the transmitted-light detector well (CH5), and heat it up for approximately 10 minutes.
- 2) Close the light shield cover.
- 3) Confirm that channel to be adjusted is CH5, and select [Gain] position by pressing [↑][↓] key. (Sensitivity is fixed as Low Gain, and cannot be changed.)
- 4) Press [Auto Adjust] key to start the gain adjustment, and when the adjustment is completed, the alarm beeps (short sounds x 3 times).
- 5) Open the light shield cover. Rotate the reaction tube set in the channel 5 detector well and verify that the indicated A/D value does not exceed 4,000. At this time, avoid the external light as much as possible. If the A/D value exceeds 4,000, set the reaction tube at the position where the indicated A/D value is the biggest and press [Auto Adjust] key again to start the adjustment.
- 6) Perform Steps 1) to 5) for channel 6.

4.2.5 Exit Adjustment

- (1) When the adjustment is completed, press [Return] key.
- (2) A screen to select FIX, Cancel the set value, and continue the adjustment is displayed.
 - 1) When the adjusted value is settled and the adjustment is completed, press [FIX].
Store the new setting value in the memory and output the value on the built-in printer, and then return to the sub-menu.

1997/05/09		
DETECT	OFFSET	GAIN
1 HIGH	118	188
LOW	134	250
PT	134	249
2 HIGH	111	168
LOW	133	244
PT	133	242
3 HIGH	108	123
LOW	130	162
PT	130	164
4 HIGH	118	176
LOW	134	243
PT	134	243
5	127	690
6	127	690

- 2) When the adjusted value is discarded and the adjustment is completed, press [Cancel] key. In this case, the setting value data is not changed and returned to the sub-menu.
- 3) When the adjustment is continued, press [Continue] key. In this case, the screen returns to the previous set screen, so you can continue the adjustment.

4.2.6 Target Value List for Adjustment

Detector Well Specified Values (Offset, Gain is A/D value)

Detector Well		CH1-4			CH5	CH6
	JIG	HIGH	LOW	PT	LOW	LOW
OFFSET	Ebonite Stick	30±10		30±10	1-20	1-20
GAIN	430 Scattering Stick	-	430±15	430±15	-	-
	750 Scattering Stick	750±20	-	-	-	-
	Distilled Water	-	-	-	3800-4000	3800-4000

4.3 Driving Unit Position Adjustment

4.3.1 Required Tools for Adjustment

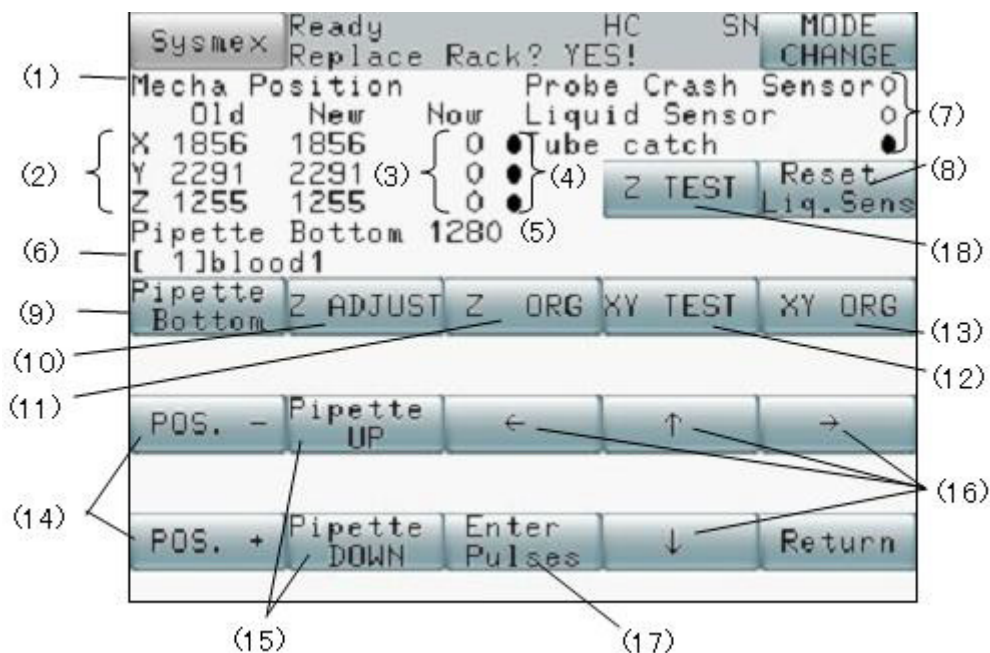
Following tools are required for this adjustment.

- (1) 4mL Sample Cup
- (2) Reaction Tube
- (3) Test tube (15 mm diameter)
- (4) Push Vial Bottle
- (5) Water (distilled water)
- (6) Dispensing Pipette (50 and 60 µL)
- (7) CA-5H Z-axis Position Adjustment Tool PM (031-0171-4)

4.3.2 How to Enter the Mechanical System Position Adjustment Mode

- (1) Start the service mode by pressing "ID No. Entry", "C", "9", "-", "0", "Enter", and "Quit".
- (2) The screen changes from "Main Menu" to "Mecha Position" by pressing keys of [Special Operate] --> [Service] --> [Adjust] --> [Mecha Position] in stand-by screen.

4.3.3 The Mechanical System Position Adjustment Screen



- (1) Indicating the title of displayed screen.
- (2) Display setting values which indicate number of pulses that pipette moves.
The pipette moves to these setting values by pressing "XY TEST" and "Z ADJUST" keys.
- (3) Display pulses of the pipette position.
Moves to these setting values by pressing "XY TEST" and "Z ADJUST" keys.
- (4) Display status of the sensor at the home position on each XYZ drive axis:
Black Circle --> Detected (Activated), White Circle --> Not Detected (Not Activated)
- (5) Display pipette lower limit.

Usually, pipette lower limit is automatically set 25 pulses added to Z position adjustment value.

(6) Display selected setting position.

(7) Display status of each sensor on the pipette:

Black Circle --> Detected (Activated), White Circle --> Not Detected (Not Activated)

REFERENCE:

The reaction tube, held by the catcher, is detected by the reflection sensor at the detection position. When Z is at the home position, the black circle will be displayed because usually the sensor is in front of the catcher.

(8) Switch to reset the detecting status of the liquid surface sensor.

(9) The display of this key changes depending on the setting position.

-Pipette Adjustment: [Pipette Bottom]

-Catcher Adjustment: [Tube Free] ←→ [Tube Catch]

(10) Move the pipette or the catcher set pulses. (Reflected to the set value)

(11) Return the pipette or the catcher to Z home position.

(12) Move XY drive according to the setting pulses. When the pipette is not at the home position, it will move to the setting value after returning to the home position.

(13) Return XY drive to the home position. When this key is pressed, Y axis --> X axis returns to the home position after Z axis returns to the home position.

(14) [Pos. -], [Pos. +] Key: Switch setting position from [1] to [29].

(15) Move the pipette or the catcher to up-down direction. ("Pipette" or "catcher" will be displayed depending on the setting position.) Moves 1 pulse by 1 press.

1) Pipette Adjustment: [Pipette UP], [Pipette DOWN]

2) Catcher Adjustment: [Catcher UP], [Catcher DOWN]

(16) Move 1 pulse by 1 press. (0,085 mm/pulse)

1) [←]: Move X axis to the left (away from the home position)

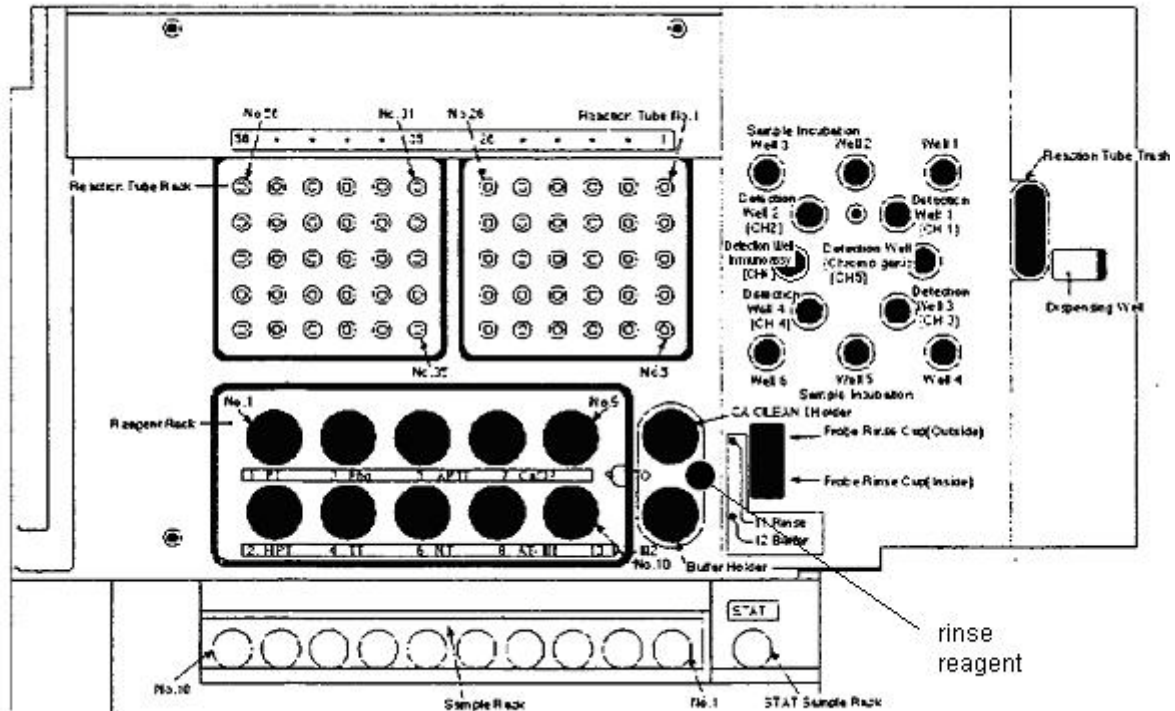
2) [→]: Move X axis to the right (toward the home position)

3) [↑]: Moves Y axis toward the home position.

4) [↓]: Moves Y axis away from the home position.

(17) Press to enter pulses manually using the numeric keys.

(18) Press to move pipette/catcher set pulse. (Not reflected to the set value)



4.3.4 Position Adjustment Procedure of Pipette ("[1]blood 1", "[2]blood 10", and "[3]blood_stat")

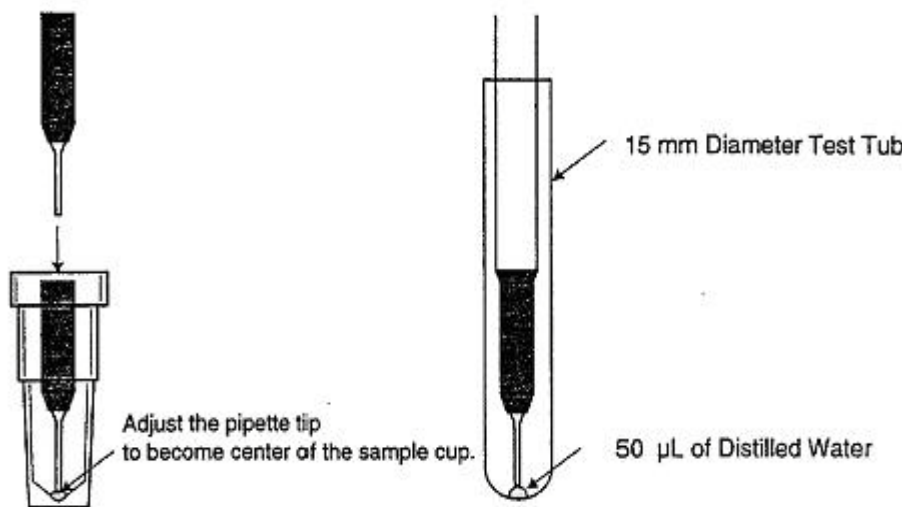
(1) XYZ Adjustment

CAUTION:

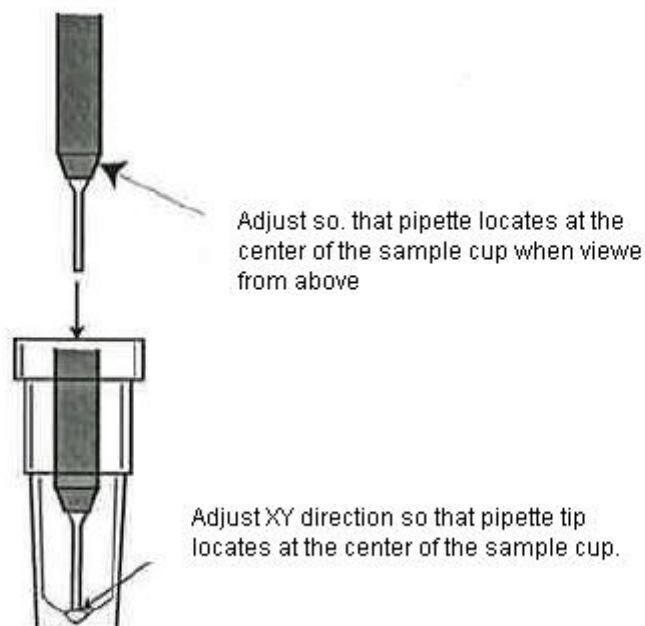
(1) When setting the sample rack, make sure that rack is inserted from the left-side first to match the cutoff part of the rack and sampler's pin. If the rack is not set properly, the top of the tube could touch the pipette, causing the pipette to be bent.

(2) When setting the 15-diameter test tube into the sample rack, set the tube straight into the sample rack.

1) Pour 50 μ L of distilled water into the 4 mL sample cup or 50 μ L of distilled water into the 15 mm diameter test tube and set it into the sample rack No.1. (Set a sample cup or a test tube for the customer's use.)



- 2) Verify that the "[1] blood 1" is shown on the left center of the screen. If not, change to "[1] blood 1" by using [Pos. -] and [Pos. +] keys.
- 3) Move the pipette to the setting position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.



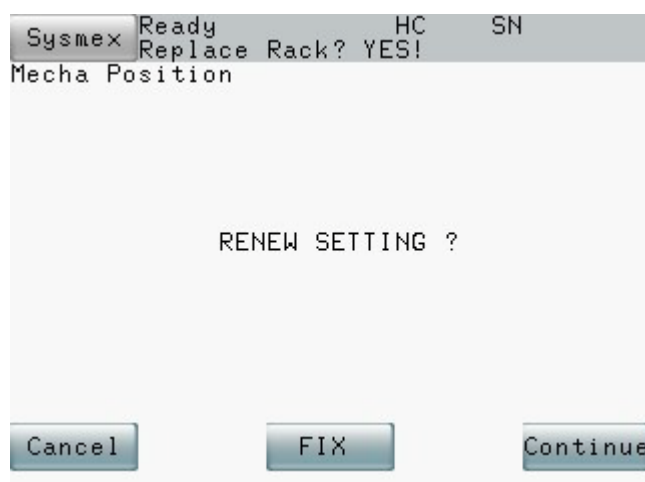
- 5) Press [Z TEST] key to descent the pipette.
- 6) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.
- 7) Press [Z TEST] key to ascend/descent the pipette. Verify that the pipette is placed at the center of the sample cup. (Z pulses will be stored as the setting value in the memory when

"Mecha Position" adjustment is completed.) The pipette detects the 50 µL of distilled water and stops.

CAUTION:

pipette descend until pipette detect liquid surface or pipette bottom pulse value. When the pipette stops before detecting liquid surface, perform Section 4.3.4, (2) Pipette Lower Limit Adjustment.

- 8) Press [Z ADJUST] several times, and confirm that the value is stable.
- 9) Move sample cup to the sample rack No. 10.
- 10) Press [Pos. +] key to select the setting position "[2]blood 10".
- 11) Perform steps 3) to 12).
- 12) Move the sample cup to the blood_stat position.
- 13) Press [Pos. +] key to select the setting position "[3] stat sample"
- 14) Perform steps 3) to 12).
- 15) The confirmation screen will be displayed by pressing [Quit] key.



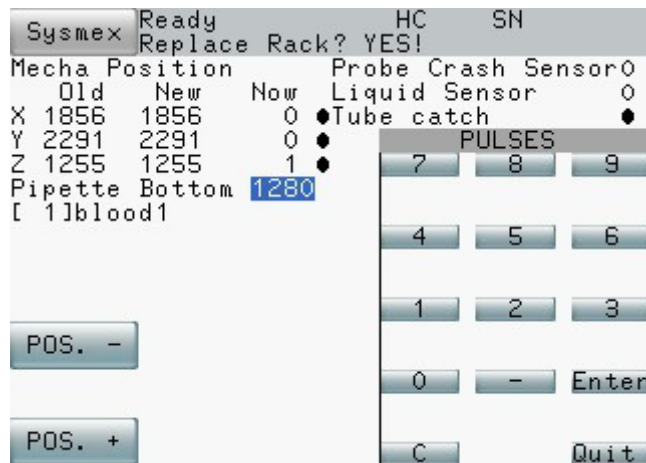
- 16) When pressing [FIX] key, new position adjustment data will be printout and return to adjustment selection screen.

(2) Pipette Lower Limit Adjustment

When [FIX] key is pressed to complete adjustment, 25 pulses are added to Z pulse setting value and the value is automatically set as the pipette lower limit.

Large value should be set as the pipette lower limit when executing Z adjustment. Be sure to set water inside the tube when setting large value manually as Z pulse. If not, it may cause the pipette to crash at the bottom of the tube or thpipettee motor to be mis-adjusted by the pulse beyond the limit.

- 1) Press [Pipette Bottom] key to display Manual Entry Screen. The number of pulse for pipette lower limit will be displayed in the reverse video and manual change is available.



2) Use numeric keys to input the value directly.

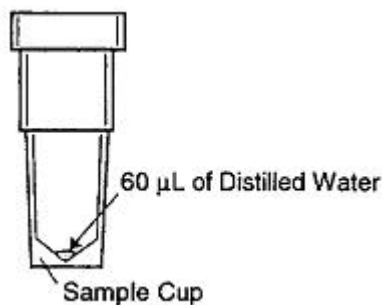
When "Z Adjustment" cannot be adjusted due to the insufficient pulse, input "1250" for temporary. The pipette lower limit value "1250" is set by pressing [1], [2], [5], [0], [Enter], [Quit] and returns to the Mecha. Position Adjustment screen. Be sure to press [Enter] key to set the value. If not, the value is not set.

3) When pressing [FIX] key, 25 pulses are added to Z pulse setting value and the value is automatically set as the pipette lower limit.

4.3.5 Position Adjustment Procedure of Pipette ("[4]reag 1")

(1) XYZ Adjustment

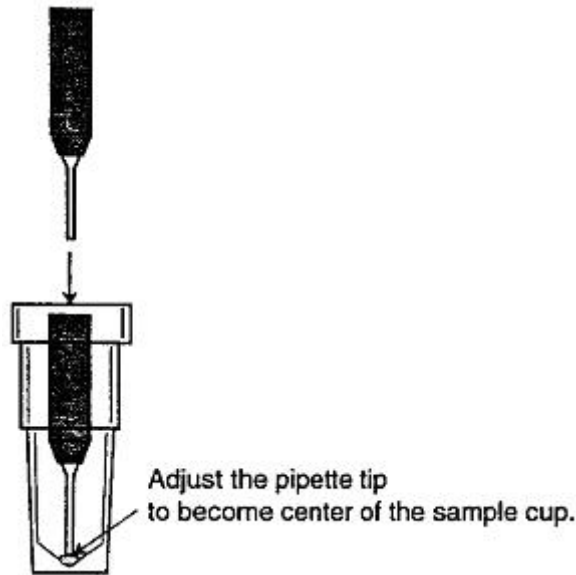
1) Set the sample cup holder to the reagent rack No. 1. Place 60 μ L of distilled water into the 4 mL sample cup.



2) Verify that the "[4]reag 1" is shown on the left center of the screen. If not, change to "[4]reag 1" by using [Pos. -] and [Pos. +] keys.

3) Move the pipette to the setting position by using [XY TEST] key.

4) Use [\uparrow] [\downarrow] [\leftarrow] [\rightarrow] keys to adjust the pipette tip to be located the center of the sample cup.



- 5) Descend pipette by using [Z Test] key.
- 6) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.
- 7) Press [Z ADJUST] key to ascend and descend the pipette. Verify the pipette is placed at the center of the sample cup. (Z pulse + 12 pulses are set) Press [Z ADJUST] key several times, and confirm that value is stable.
- 8) Press [XY ORG] key to return the pipette (head) to the home position after the confirmation.
- 9) Adjust "[5]reag 9" and "[6]reag 10" in the same way.

CAUTION:

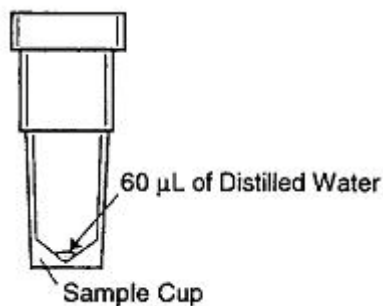
Descend the pipette's lower limit to the lowest for Z axis adjustment value. Adjust after executing Section "4.3.4: Position Adjustment Procedure of Pipette, (2) Pipette Lower Limit Adjustment" when it stops before detecting liquid surface. Set "700" pulse for the pipette lower limit of the reagent rack.

4.3.6 Position Adjustment Procedure of Pipette ("[7]reag_rinse")

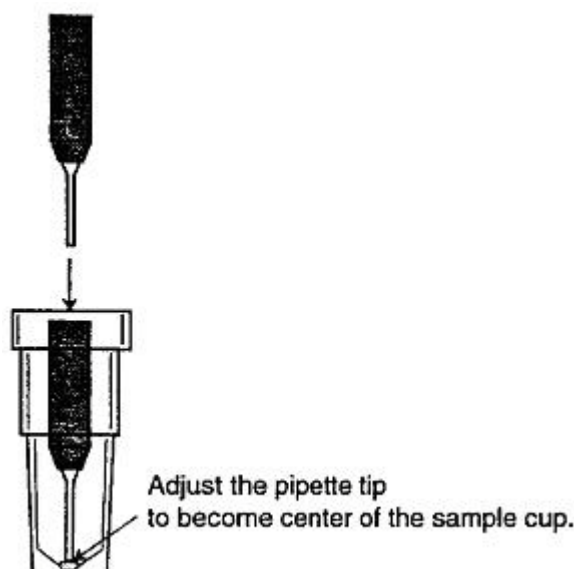
4.3.6.1 Individual adjustment

(1) XYZ Adjustment

- 1) Set the sample cup holder to the rinse reagent holder. Place 60 μ L of distilled water into the 4 mL sample cup.



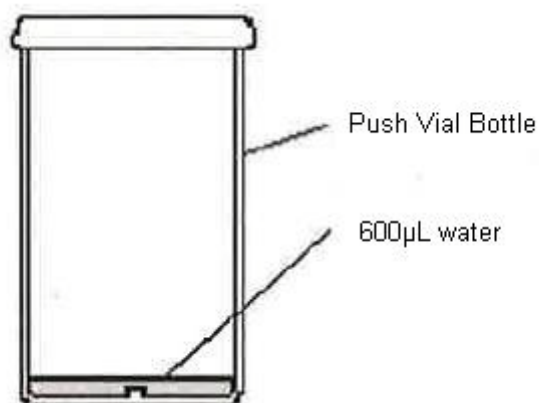
- 2) Verify that the "[7]reag_rinse" is shown on the left center of the screen. If not, change to "[7]reag_rinse" by using [Pos. -] and [Pos. +] keys.
- 3) Move the pipette to the setting position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.



- 5) Press [Z TEST] key to descent the pipette.
- 6) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.
- 7) Press [Z TEST] key again to ascend/descent the pipette. Verify that the pipette is placed at the center of the sample cup.
- 8) Press [XY ORG] key to return the pipette (head) to the home position.
- 9) Adjust "[8]buffer" "[37] reag_rinse 2" in the same way.

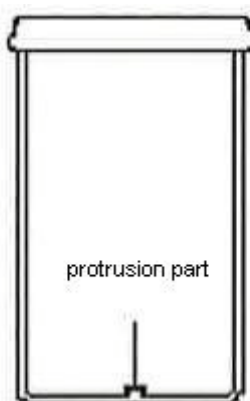
(2) Z Adjustment

- 1) Place 600µL water to Push Vial Bottle, and set it to rinse reagent position.



CAUTION:

Push Vial bottle has a protrusion at the bottom. Make sure that this part is placed under the liquid surface. If the bottle is shaken a little, the protrusion part becomes under the liquid surface.



- 2) Move pipette to adjustment position by pressing [XY Test] key.
- 3) Descend pipette by pressing [Z ADJUST] key.
- 4) The pipette detects the 600 µL of distilled water and stops. The Z pulse at this time is stored as set value to memory when [Mech position adjustment] is completed. Press [Z ADJUST] key several times, and confirm that value is stable.

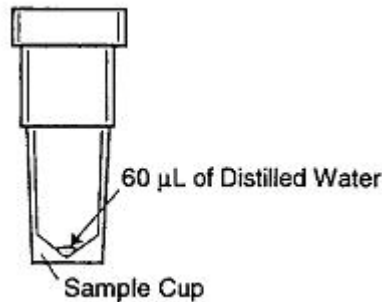
CAUTION:

Descend the pipette's lower limit to the lowest for Z axis adjustment value. Adjust after executing Section "4.3.4: Position Adjustment Procedure of Pipette, (3) Pipette Lower Limit Adjustment" when it stops before detecting liquid surface. Set "650" pulse for the pipette lower limit of the reagent rack.

5) Adjust “[8] Buffer” in the same way.

(3) Z adjustment for “[37] Rinse 2”

1) Place 60 μL water to new 4 mL sample cup, and set it to “[37] reag_rinse 2”.



2) Move pipette to adjustment position by pressing [XY Test] key.

3) Descend pipette by pressing [Z ADJUST][Z ADJUST] key.

4) The pipette detects the 60 μL of distilled water and stops. The Z pulses at this time is displayed in the setting.

5) Repeat 3), 4) to check the value does not change for more than 2 times. Enter the pulse (current pulse + 45), and press [Enter], [Quit] key. The set value is stored to memory when “Mech. position adjustment” is completed.

4.3.6.2 Continuous Z position adjustment

(1) XY Adjustment

1) Set sample cup holder to reagent rack position 1, and set 4mL sample cup.

2) Verify that “[4] reag_rinse 1” is shown on the left center of the screen. If not, change to “[4] reag_rinse 1” by using [Pos. -] and [Pos. +] keys.

3) Move pipette to adjustment position by using [XY Test] key.

4) Adjust the pipette tip to be located at the center of the sample cup by using [\uparrow] [\downarrow] [\leftarrow] [\rightarrow] keys.

5) Perform XY adjustment for “[5] reag_9”, “[6] reag_10”, “[7] reag_rinse”, and “[8] Buffer” positions in the same way.

(2) Continuous Z position adjustment

1) Select “[4] reag_1” by using [Pos. -] and [Pos. +] keys.

2) Add 50 more pulses to Z pulse by pressing [Manual Entry] key.

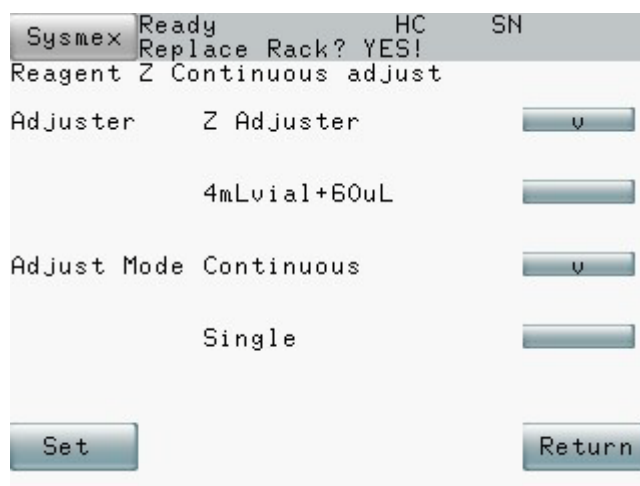
3) Press [Quit]-->[Quit]-->[Fix] key to save the setting.

4) Enter the “Mecha. Position” screen again.

5) Set “CA-5H Z-axis Position Adjustment Tool” to reag_1-10, reag_rinse, and buffer position. (total 12 places)

6) Change to “[4] reag_1” by using [Pos. -] and [Pos. +] keys, and press [Z ADJUST][Z ADJUST] key.

7) Check the check box for [Z adjuster] [Continuous].



- 8) Press [Set] key to perform the continuous Z position adjustment.
- 9) After the adjustment, press [Quit]-->[Fix] key to save the adjustment value.

If the “CA-5H Z-axis Position Adjustment Tool” is not available, adjust in the following procedure by using sampel cup with 60 μ L water instead

- 1) Pour 60 μ L water in the sample cup (12 pcs), and set them to reag_1-reag_10, reag_rinse, and buffer position.
- 2) Press [Z Test] key, and check the checkbox for [4mL vial +60 μ L], [continuouse adjustment].
- 3) Press [Execure] key to perform continuous Z position adjustment.
- 4)After the adjustment, press [Quit]-->[Fix] key to save the adjustment value.

Remarks:

If you select “Indivisual adjustment”, you can perform position adjustment for reag_1 to reag_10 individually.

4.3.7 Position Adjustment Procedure of Pipette (“[10]wash_o)

- (1) XYZ Adjustment

CAUTION:

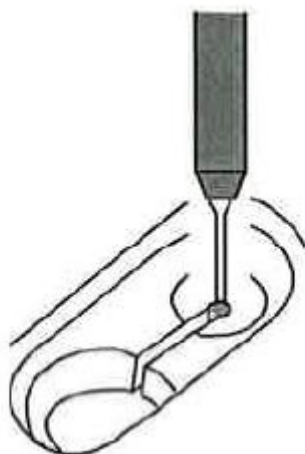
"[9]wash_i" Adjustment:

The value of the pipette rinse cup (inside) is calculated automatically from the setting value of the pipette rinse cup (outside). It will be stored in the memory when "Mecha Position" adjustment is completed.

Pipette Rinse Cup (Inside) Value

	[10]wash_o	[9]wash_i
X set value	Pipette rinse cup (outside) set value	Same as pipette rinse cup (outside) set value
Y set value	Pipette rinse cup (outside) set value	"Pipette rinse cup (outside) set value"+200
Z set value	Pipette rinse cup (outside) set value	Same as pipette rinse cup (outside) set value

- 1) Select [Special Operate] --> [Rinse & Prepare] from the Main Menu and supply rinse reagent into the pipette rinse cup (outside) on ahead.
- 2) Verify that the "[10]wash_o" is shown on the left center of the screen. If not, change to "[10]wash_o" by using [Pos. -] and [Pos. +] keys.
- 3) Move the pipette to the adjustment position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the sample cup.
- 5) Press [Z TEST] key to descent the pipette.
- 6) Use[↑][↓][←][→] keys to adjust the pipette tip to located at the center of the pipette rinse cup (outside).
- 7) Press [Z TEST] key again to ascend/descend the pipette. Verify that the pipette is placed at the center of the rinse cup (outside).

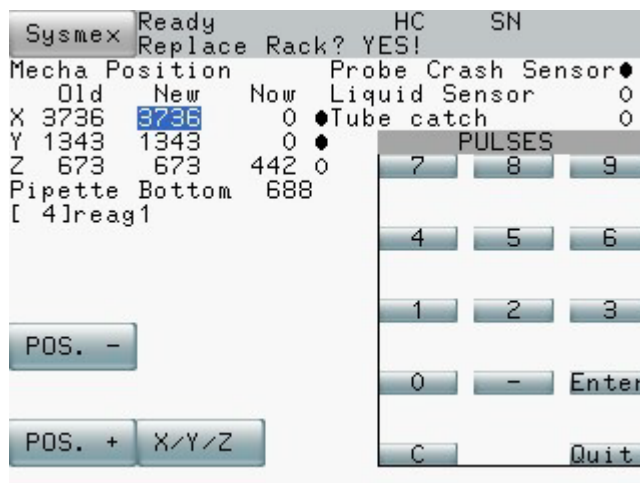


- 8) Press [XY ORG] key to return the pipette (head) to the home position.

(2) Z Adjustment

- 1) Select [Special Operate] --> [Rinse & Prepare] from the Main Menu and supply rinse reagent into the pipette rinse cup (outside) on ahead.

- 2) Move the pipette to the adjustment position by using [XY TEST] key.
- 3) Press [Z ADJUST][Z ADJUST] key to descent the pipette.
- 4) The pipette detects the liquid surface of the pipette rinse cup (outside) and stops. The following screen will appear by pressing [Enter Pulses] key. Press [X/Y/Z] key twice to move cursor to "Z". Enter 25 added pulses to present Z pulses and press [Enter] and then [Quit] key. The value will be stored in the memory when "Mecha Position" adjustment is completed.



4.3.8 Position Adjustment Procedure of Pipette ("[11]p_tube 1)

Adjustment Parameter: Adjust XYZ pulse for pipette position

Summary: Use the sample tube with 50 μ L of distilled water inside for the position adjustment.
Adjust 3 positions for each two separated tube palette.

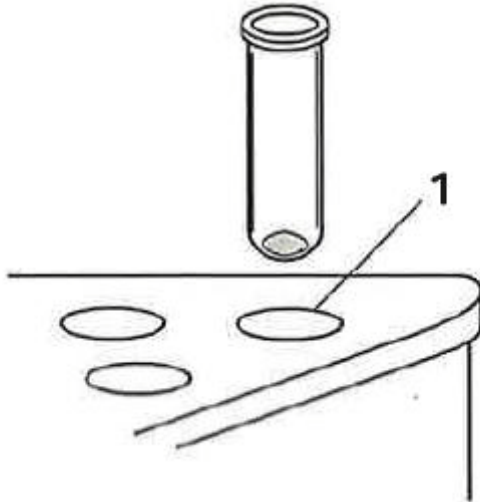
Standard position:

XY direction: The center of each sample tube set into the adjustment position of the tube palette.

Z direction: The lowest point of the pipette descended to the sample tube, with 50 μ L of the distilled water inside, of each adjustment position of the tube palette.

(1) XYZ Adjustment

- 1) Pour 50 μ L of water into the reaction tube, and set it in the No. 1 position of tube palette.



- 2) Verify that the "[11]p_tube 1" is shown on the left center of the screen. If not, change to "[11]p_tube 1" by using [Pos. -] and [Pos. +] keys.
- 3) Move the pipette to the setting position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust the pipette tip to be located at the center of the reaction tube.



CAUTION:

- 1) Do not execute Z operation when XY adjustment is insufficient.
- 2) Be sure that the pipette tip is located at the center of the reaction tube. If not, it may cause the pipette to touch the reaction tube when descended.

- 5) Press [Z TEST] key to descent the pipette.
- 6) Use [↑][↓][←][→] keys to adjust the pipette tip (black part with 5mm diameter) to be located at the center of the reaction tube.

- 7) Press [Z ADJUST] key to return to home position, or to descend the pipette. Verify that the pipette tip is placed at the center of the reaction tube. The pipette detects the 50 μ L of distilled water inside the reaction tube, and stops. Z pulses at this time will be stored as the setting value in the memory when "Mecha Position" adjustment is completed.
- 8) Press [XY ORG] key to return the pipette (head) to the home position when the adjustment is completed.
- 9) Perform the position adjustment for: [11]p_tube 1, [12]p_tube 5, [13]p_tube 26, [14]p_tube 31, [15]p_tube 35 and [16]p_tube 56 in the same way.

4.3.9 Position Adjustment Procedure of Catcher ("[17]c_tube 1")

Adjustment Parameter: Catcher Position XYZ pulses of Tube Palette.

Summary: Adjust the catcher position of the tube palette by setting the reaction tube to the catcher. Adjust 3 positions for each two separated tube palette.

Standard Position:

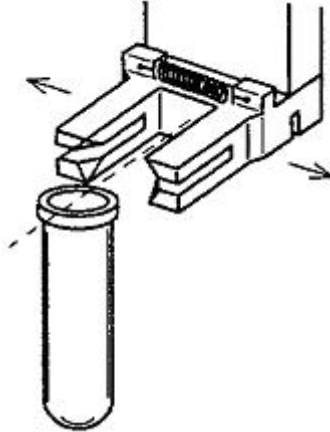
X direction: 5 pulses to the left of the line where the left surface of the reaction tube, when descended, agrees the interior surface of the reaction tube rack.

Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.

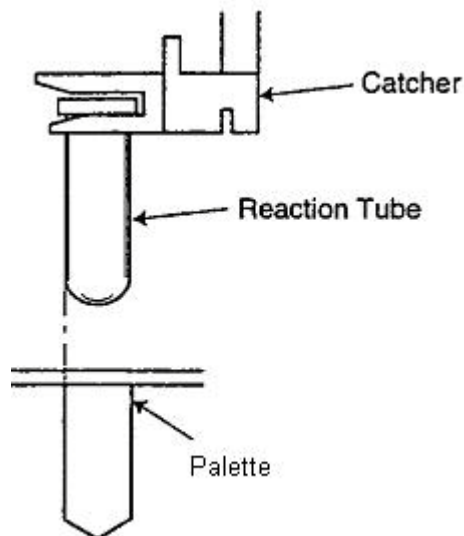
Z direction: 5 pulses above the line where the bottom of the reaction tube agrees to the bottom of the tube palette.

(1) XYZ Adjustment

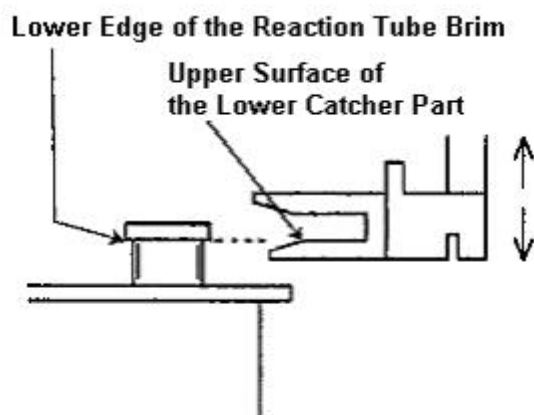
- 1) Place the reaction tube to the catcher.
- 2) Verify that the "[17]c_tube 1" is shown on the left center of the screen. If not, change to "[17]c_tube 1" by using [Pos. -] and [Pos. +] keys.
- 3) Move the catcher to the adjustment position by using [XY TEST] key.
- 4) Use [\uparrow] [\downarrow] [\leftarrow] [\rightarrow] keys to adjust the reaction tube placed to the catcher locates at the center of the tube palette rack hole.
- 5) After removing the reaction tube or pressing [Tube Free] key, press [Z TEST] key to descent the catcher.
- 6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
 - (a) Y direction: Use [\uparrow] [\downarrow] keys to adjust the center of the reaction tube agrees the center of the catcher.



(b) X direction: Use [←][→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends when pressing [Tube Catch] -->[Z Test] key. Adjust the reaction tube position in X direction so that the center of the reaction tube locates at the center of the tube palette.



(c) Z direction: After pressing [Z ADJUST] key, perform adjustment so that lower edge of the reaction tube brim agrees upper surface of the lower catcher part. Use [Tube Catch] key, and press [Catcher UP] key to confirm the position where the catcher holds reaction tube. Press [Catcher UP] key 5 times from the position. Press [Z ADJUST] key for 2 or 3 times to confirm that the reaction tube does not hit the bottom of the reaction tube rack.



- 7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
- 8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards to the left by pressing [←] key (for 5 times). This is the X adjustment value.
- 9) When completed, press [XY ORG] key to return the catcher to the home position.
- 10) Setting Position: [18]c_tube 5, [19]c_tube 26, [20]c_tube 31, [21]c_tube 35, [22]c_tube 56
Adjust above 5 positions in the same way.

4.3.10 Position Adjustment Procedure of Catcher ("[23]warm 1)

Adjustment Parameter: Catcher Position XYZ pulses of Detector Block

Summary: Adjust the catcher XY and Z positions of the detector block by setting the reaction tube to the catcher.

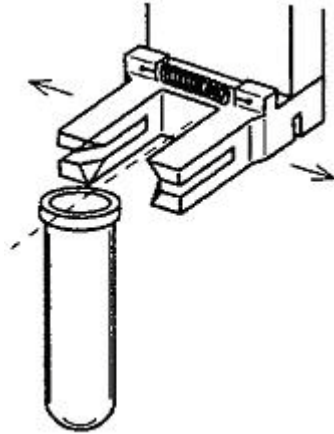
Standard Position:

- X direction: 5 pulses to the left of the line where the left surface of the reaction tube, when descended, agrees the interior surface of the sample incubation well.
- Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.
- Z direction: Set reaction tube to incubation well and detector well. Press [Tube Catch] when lower edge of the reaction tube brim agrees upper surface of the lower catcher part. Keep pressing [Catcher UP] key until the catcher holds reaction tube properly. The standard position in Z direction is 5 pulses above from the position.

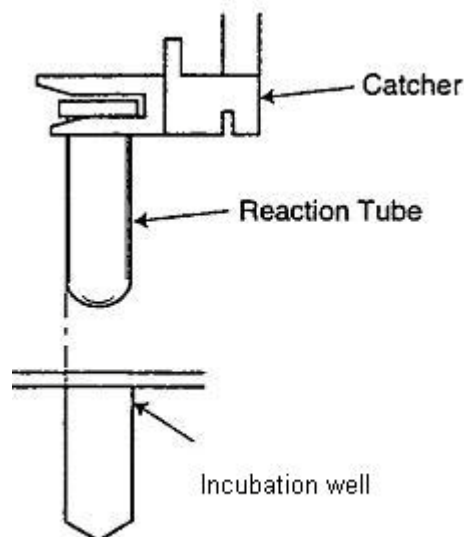
(1) XYZ Adjustment

- 1) Place the reaction tube to the catcher.
- 2) Verify that the "[23]warm 1" is shown on the left center of the screen. . If not, change to "[23]warm 1" by using [Pos. -] and [Pos. +] keys.
- 3) Move the catcher to the setting position by using [XY TEST] key.

- 4) Use [↑][↓][←][→] keys to adjust the reaction tube placed to the catcher to be located at the center of the sample incubation well.
- 5) Press [Z TEST] key to descent the catcher.
- 6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
 - (a) Y direction: Use [↑][↓] keys to perform adjustment so that the center of the reaction tube agrees the center of the catcher.

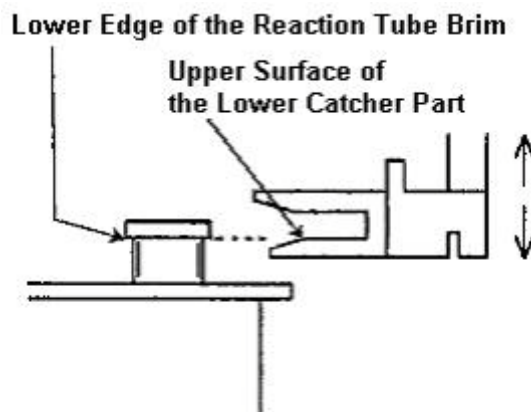


- (b) X direction: Use [←][→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends by pressing [Tube Catch]-->[Z ADJUST] key. Adjust the reaction tube position in X direction so that the reaction tube touches the left part of the inner wall of the incubation well by repeating this operation.



- (c) Z direction: After pressing [Z ADJUST] key, perform adjustment so that lower edge of the reaction tube brim agrees upper surface of the lower catcher part. Use [Tube Catch] key, and press [Catcher UP] key to confirm the position where the catcher holds reaction tube. Press [Catcher UP] key 5 times from the position.

Press [Z ADJUST] key for 2 or 3 times to confirm that the reaction tube does not hit the bottom of the reaction tube rack.

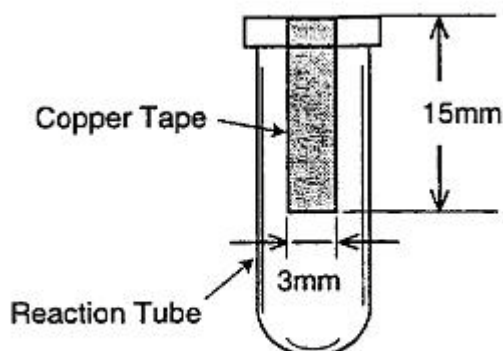


- 7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
- 8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards left by pressing [←] (for 5 times). This is the X adjustment value.
- 9) When completed, press [XY ORG] key to return the catcher to the home position.
- 10) Setting Position: [24]warm 3, [25]warm 4, [26]comp
Adjust above 3 positions in the same way.

4.3.11 Position Adjustment Procedure of Catcher ("[27]shake)

Adjustment Parameter: XYZ pulses of Reagent Dispensing Position

Summary: Use the "JIG tube for adjustment" to adjust reagent dispensing position. Prepare the reaction tube that the 3 mm width x 15 mm length copper tape is attached inside.
(The copper tape should be attached straight from the top of the flange.)

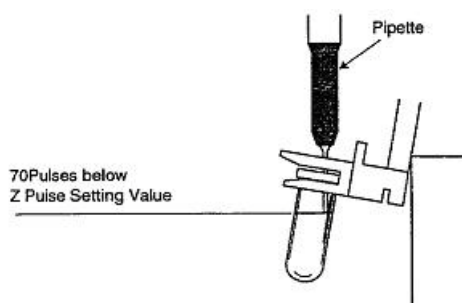


(1) XYZ Adjustment

- 1) Set the JIG tube to the catcher.
- 2) Change the setting position to "[27]shake" by using [Pos. -] and [Pos. +] keys.
- 3) Confirm that Z pulse is "-40". If not, input "-40" to Z pulse by selecting "Enter Pulses".
- 4) Press [XY TEST] key to move XY of the pipette to the dispensing position. .
- 5) Press [Pipette 70 step] key. (Z pulse value becomes "30")
- 6) Use [←] [→] keys to move the pipette position where pipette can touch the interior surface of the reaction tube. When the pipette tip touches the copper tape inside the tube, the liquid sensor display on the screen changes from the white circle to the black circle. This X pulse is the setting value.

If pipette tip already touches the cooper tape, move the pipette to the left direction by several pulses first, and perform adjustment.

- 7) Press [Pipette Return] key. (Z pulse value becomes "-40").



- 8) Press [XY ORG] key to return the pipette to the home position.

CAUTION:

DO NOT press [Z TEST] or [Z ORG] key instead of [XY ORG]. That will cause pipette crash.

4.3.12 Position Adjustment Procedure of Catcher ("[28]dust)

Adjustment Parameter: Catcher Position XYZ pulses of Reaction Tube Trash

Summary: Adjust the catcher XY and Z positions of the reaction tube trash by setting the reaction tube to the catcher.

Standard Position:

Y direction: A center of the waste position mark on the panel agrees a center of the reaction tube.

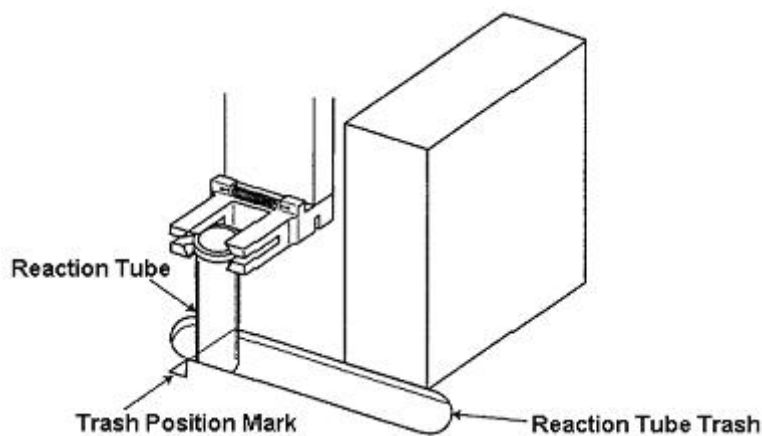
Z direction: Catcher bottom is located 20 pulses (approx. 1.7 mm) above the panel.

X direction: When Z pulse is as above, the reaction tube caught by the catcher is at the panel side of the reaction tube trash. (Almost touches the trash.)

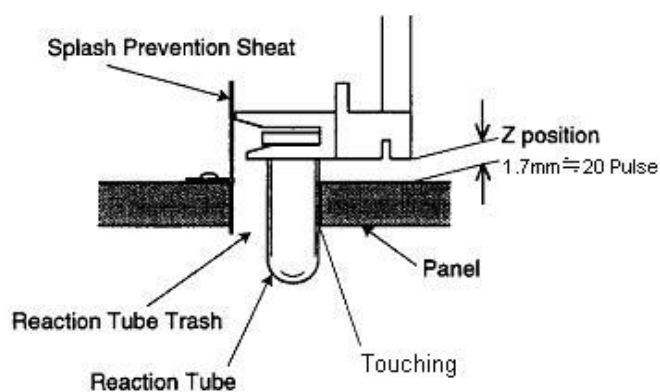
(1) XY Adjustment

- 1) Set the reaction tube to the catcher.

- 2) Verify that the "[28]dust" is shown on the left center of the screen. If not, change to "[28]dust" by using [Pos. -] and [Pos. +] keys.
- 3) Move the catcher to the setting position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust Y direction to a center of the waste position mark and the reaction tube. Adjust X direction at the panel side of the reaction tube trash.



- 5) Press [Z ADJUST] key to descent the catcher.
- 6) Use [↑][↓][←][→] [Catcher UP], and [Catcher DOWN] keys to adjust the catcher position so that Z pulse becomes 20 pulses (approx. 1.7 mm) above the reaction tube trash panel. Adjust Y direction to the center of the waste position mark and the reaction tube. Adjust the reaction tube position in X direction to touch the panel side of the reaction tube trash.



- 7) Press [Z TEST] key to return to the home position and descent the catcher. Verify that the reaction tube enters smoothly into the reaction tube trash.
- 8) Press [Z TEST] key to descent the catcher.
- 9) Use [Tube Free] and [Tube Catch] keys to verify that the reaction tube enters smoothly into the reaction tube trash.
- 10) When the adjustment is completed, press [XY ORG] key to return pipette (head) to the home position.

4.3.13 Position Adjustment Procedure of Catcher ("[29]immunoassy)

Adjustment Parameter: Catcher Position XYZ pulses of Detector Block

Summary: Adjust the catcher in XY direction, and Z position of the detector block by setting the reaction tube to the catcher.

Standard Position:

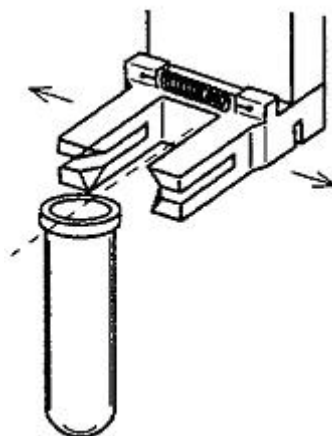
X direction: 5 pulses to the left of the line where the left surface of the reaction tube agrees the interior surface of the incubation well when reaction tube is descended.

Y direction: The center of the catcher agrees the center of the reaction tube when the reaction tube is descended.

Z direction: Set reaction tube to incubation well and detector well. The standard position is 2 pulses above the bottom of the immunoassay well when catch/release is performed.

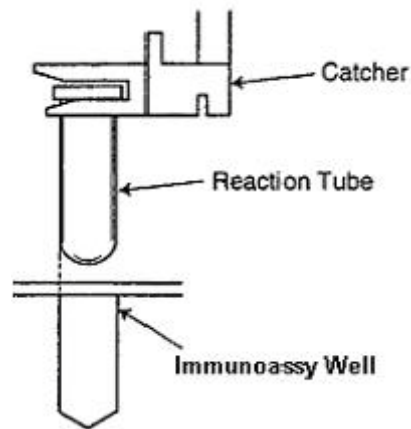
(1) XYZ Adjustment

- 1) Set the reaction tube to the catcher.
- 2) Verify that the "[29]immunoassy" is shown on the left center of the screen. If not, change to "[29]immunoassy" by using [Pos. -] and [Pos. +] keys.
- 3) Move the catcher to the setting position by using [XY TEST] key.
- 4) Use [↑][↓][←][→] keys to adjust the reaction tube placed to the catcher to be located at the center of the immunoassay well.
- 5) Press [Z TEST] key to descent the catcher.
- 6) Press [Tube Free] and [Tube Catch] keys to release and catch the reaction tube.
 - (a) Y direction: Use [↑][↓] keys to adjust the center of the reaction tube agrees the center of the catcher.

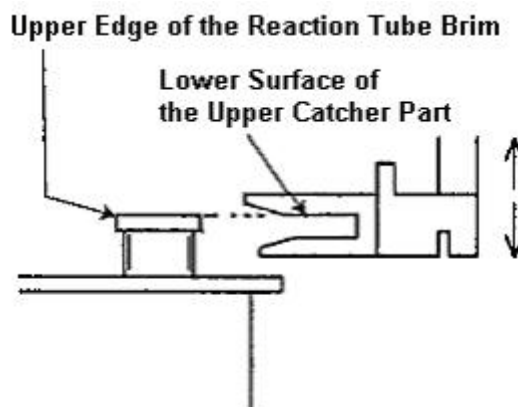


- (b) X direction: Use [←][→] keys to adjust the horizontal position of catcher. The catcher once ascends and then descends by pressing [Tube Catch]--> [Z Test] key. Adjust

so that reaction tube position in X direction agrees the left part of the inner wall of the immunoassay well by repeating this operation.



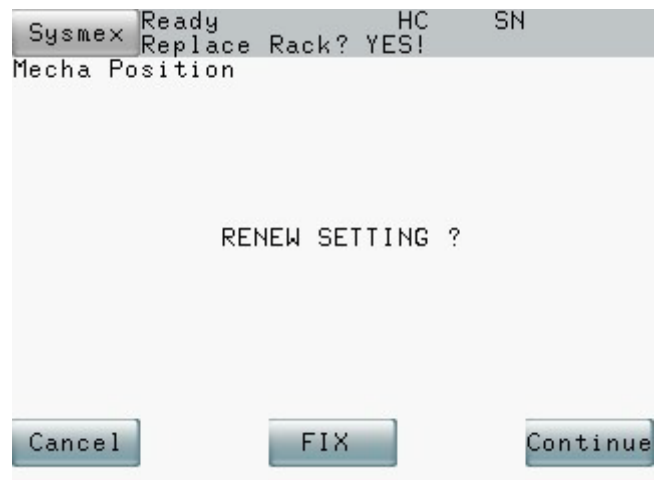
- (c) Z direction: After pressing [Z ADJUST] key, perform adjustment so that upper edge of the reaction tube brim agrees lower surface of the upper catcher part. Use [Tube Catch] key, and press [Catcher UP] key until the catcher holds reaction tube. Press [Catcher UP] key 5 times from the position. Press [Z ADJUST] key for 2 or 3 times to confirm that the reaction tube does not hit the bottom of the reaction tube rack.



- 7) Press [Tube Free] and [Tube Catch] keys to verify that the reaction tube to be caught and released smoothly.
- 8) When the adjustment is completed, catch the reaction tube and return the catcher to the Z home position by using [Z ORG] key. Move X axis 5 pulses towards to the left by pressing [←] key (for 5 times). This is the X adjustment value.
- 9) When completed, press [XY ORG] key to return the catcher to the home position.

4.3.14 Output Setting Values

(1) Press [Return] key on the right bottom of the screen to display the confirmation screen as follows:



(2) Press [FIX] key to update the setting value and then output.

4.4 TEMPERATURE ADJUSTMENT

4.4.1 Temperature Control Summary

The temperature control CPU gets each unit's temperature by A/D converted signal as a temperature from the sensor. Temperature control of each unit is performed by acquired temperature. Because the voltage comes out from the temperature sensor is various, the Main CPU sends the Offset value to the temperature control CPU for each sensor to get the temperature within the range.

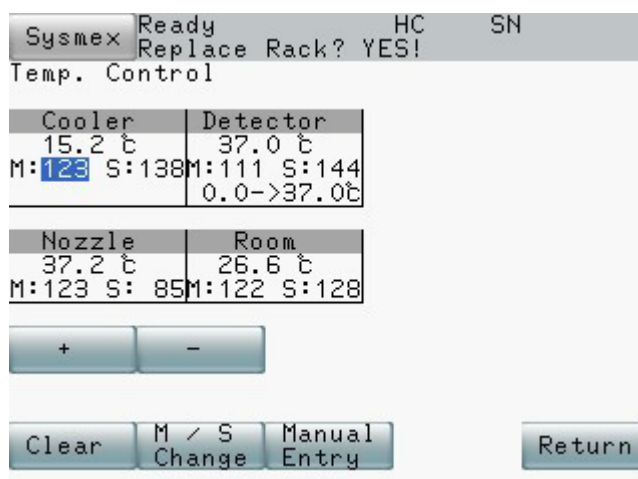
REFERENCES:

<Temperature sensor in use>

- (1) Temperature sensor in cooling unit: LM35DZ high accuracy celsius direct reading temperature sensor IC
- (2) Temperature sensor in detector block: LM35DZ high accuracy celsius direct reading temperature sensor IC
- (3) Temperature sensor in pipette: CB-5 or ZCB-5 glass beads thermistor
- (4) Ambient temperature sensor: LM35DZ high accuracy celsius direct reading temperature sensor IC

4.4.2 Offset input of temperature sensor

- (1) Enter the service mode.
- (2) Select [Special Operate] --> [Service] --> [Adjust] --> [Temp. Control].



- (3) Touch the sensor area where you want to adjust the temperature.
- (4) Use the numeric keys by pressing [Manual Entry], and input offset value to "S:XXX".
- (5) Press [Enter]-->[Quit] key to finish.

- (6) The input value will be stored in the memory by pressing [FIX] key when exiting the Temp. Control screen.

REFERENCES:

The offset value is fixed by the shipping test and attached to the PM parts

CAUTION:

(1) Do not change the "M:XXX" value. This is the offset value for the temperature control circuit

(2) Offset for the temperature control circuit is performed for all PCBs. Therefore, it is not necessary to adjust it in the field.

(3) Only when CPU board is replaced, modify the "M:XXX" values to the values listed on the label attached on the new CPU board "PCB (PM) NO.11 (P/N: BW985575)" A: 311K037

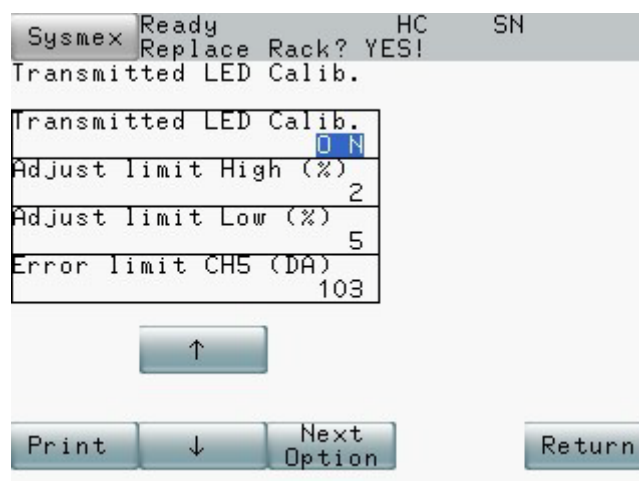
4.5 Transmitted-light LED Adjustment

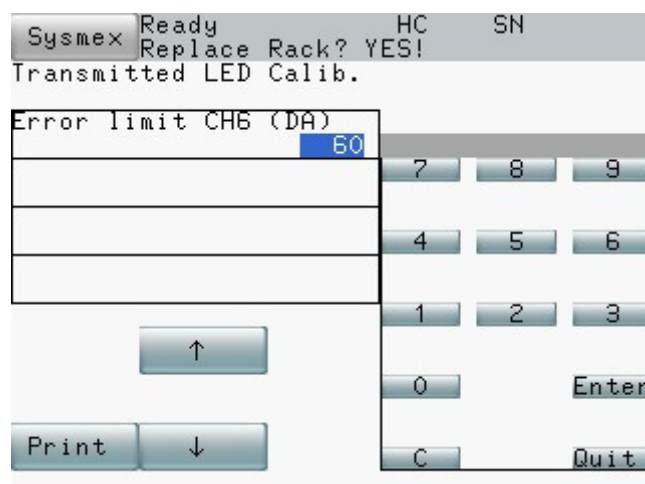
4.5.1 Summary of transmitted-light LED function

- (1) Light amount check is performed by pipette's dispensing 200µL buffer to reaction tube, transferring to each detector well, with current offset/gain.
- (2) Light amount check is performed after judging the necessity based on the result of light amount check in detector block. The light amount check in detector block is operated after instrument starts up, or at the start of first measurement batch after turning on electricity for 24 hours.
- (3) Only gain sensitivity of transmitted-light detector block is automatically adjusted, and offset adjustment is not operated.
- (4) Data output for first sample is delayed for minutes required for light amount check in detector block, which is performed prior in the adjustment, and time required for the adjustment (approximately 1 minute).
- (5) Light amount check is performed only when the parameter is not set in the measurement group. If the instrument does not install transmitted-light detector block, this function does not work.
- (6) Adjustment is performed for detector channel that is considered as adjustment shift by light amount check.
- (7) If the gain DA value becomes less than 50 because of LED's deterioration of light amount/LED's life time after the completion of the adjustment, a message will appear to notify users to replace the LED. Even in this case, measurement can be operated as usual after the adjustment.
- (8) Sensitivity value after adjustment (DA value) in the past 10 times are stored so that field engineer can refer to the past adjustment result.

4.5.2 LED Auto Calibration ON/OFF

- (1) Enter by service more
- (2) Select [Maintenance] -->[Service]-->[Adjustment]-->[Transmitted LED Calib.].

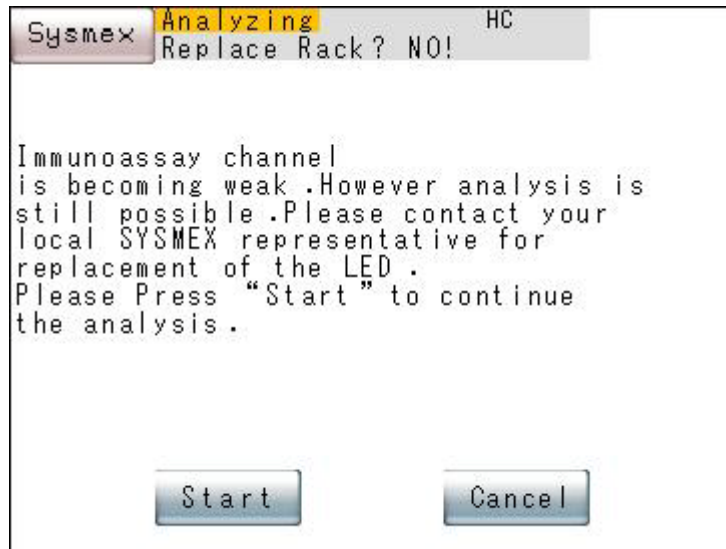




Item	Meaning	How to input	Input range (default)
LED calibration	ON/OFF LED calibration ON: Validate LED auto calibration function OFF: Invalidate LED auto calibration function	Next option key	ON/OFF (ON)
Upper limit for adjustment (%)	Perform adjustment when AD value surpasses target value (set value in sensitivity adjustment menu) for certain rate.	numeric key	0-100 (2)
Lower limit for adjustment(%)	Perform adjustment when AD value underruns target value (set value in sensitivity adjustment menu) for certain rate.	numeric key	0/100 (5)
Replacement limit CH5(DA)	Show message to notify users the abnormality of detector block for chromogenic when the gain adjustment value underruns the set value.	numeric key	0/1023 (103)
Replacement limit CH6(DA)	Show message to notify users the abnormality of detector block for immunoassay when the gain adjustment value underruns the set value.	numeric key	0/1023 (575nm:60 800nm:167)

4.5.3 Message to notify users to replace LED

Message to notify users to replace LED appears when gain adjustment value becomes less than the set value after auto sensitivity adjustment is completed.



**Message to notify users the replacement of LED
(In case of detector well for immunoassay method)**

[Start] key: Continue the measurement operation.

[Cancel] key: Stop the measurement operation, and goes back to the stand-by screen.

If the sensitivity of other detector well is decreasing, the following messages appear.

Detector well	Message
Chromogenic method	Chromogenic channel is becoming weak. However analysis is still possible. Please contact to your local SYSMEX representative for replacement of the LED. Please press "Start" to continue the analysis.
Chromogenic and Immunoassay method	Chromogenic and Immunoassay channels are becoming weak. However analysis is still possible. Please contact to your local SYS-MEX representative for replacement of the LED. Please press "Start" to continue the analysis.\

4.5.4 Adjustment procedure

(1) Start the measurement. Light amount check is performed if either conditions below are met at the start of measurement.

-When measurement is started right after instrument starts up, or when measurement is started right after passing 24 hours with electricity turned on.

*Time for "24 hours" is counted since sensitivity adjustment for either chromogenic or immunoassay detector well starts.

- Setting for transmitted-light LED calibration is ON.
 - In case of chromogenic detector well, measurement group has a parameter for chromogenic.
 - In case of immunoassay detector well, measurement group has a parameter for immunoassay.
- (2) If the following conditions are met after light amount check is performed, gain adjustment is operated. If not, gain adjustment is not operated, and measurement continues.
- AD value surpasses/underruns target value (sensitivity adjustment menu) for certain rate, or 4095 and more.
- AD value > target value x (1 + adjustment upper limit/100) or AD value \geq 4095
 Or, AD value > target value x (1 - adjustment lower limit/100)
- (3) Light amount check and adjustment are performed in the following procedure.
- 1) Dispense 200 μ L buffer to reaction tube by pipette, and transfer the reaction tube to detector well.
 - 2) Perform light amount check for detector well where the reaction tube in 1) is transferred. If adjustment is necessary, perform gain adjustment. The target value at this time is the one set in detector block adjustment menu.
 - 3) Store the adjustment value.
 - 4) Discard the reaction tube for the adjustment to trash.

CAUTION:

Light amount check and adjustment are performed by one reaction tube, in the order of chromogenic --> immunoassay.

- (4) After the adjustment is completed, measurement operation automatically starts.

4.5.5 Confirm sensitivity adjustment history

Pressing [Print] key in the Transmitted-light LED calibration setting screen allows users to print the adjustment result for each channel in the past 10 times and current adjustment value. If adjustment is performed in sensitivity adjustment in service menu, "S" is added to the performed date. Sensitivity adjustment history can be erased by initializing BBURAM (Turn on DipSW6, and turn the main power OFF/ON).

CAUTION:

How to initialize LED calibration history differs depending on the memorization way.

**Transmitted Light
LED Calibration History**

Current

CH5: 175 CH6: 182

2001/05/01 S

CH5: 176 CH6: 192

2001/04/15

CH5: 176 CH6: 192

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.

2001/09/06

CH5: 175 CH6: 194

2001/08/05

CH5: 177 CH6: 194

4.6 Adjustment procedure of Mixing Motor Driving Voltage

4.6.1 Adjustment procedure for circuit of mixing motor driving voltage

- (1) Connect Voltage Gauge between 1 pin (+) and 2 pin (GND) for J121 on PCB NO.60020.
- (2) Adjust VR101 so that voltage becomes $1.05 \pm 0.02V$ when mixing motor rotates.
- (3) Fix VR101 by paint rock.

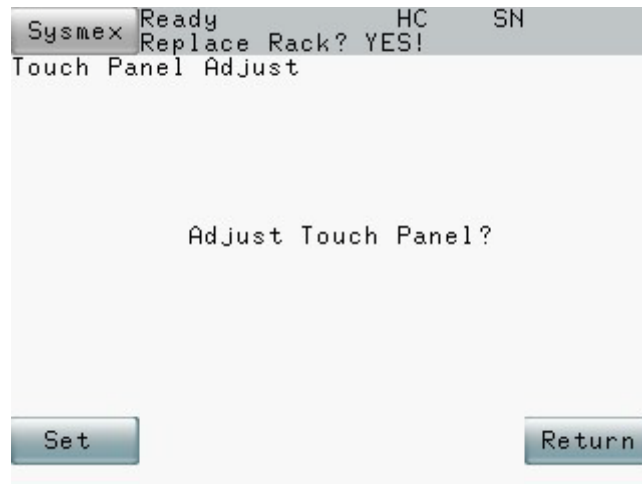
CAUTION:

Normally, this adjustment is not necessary.

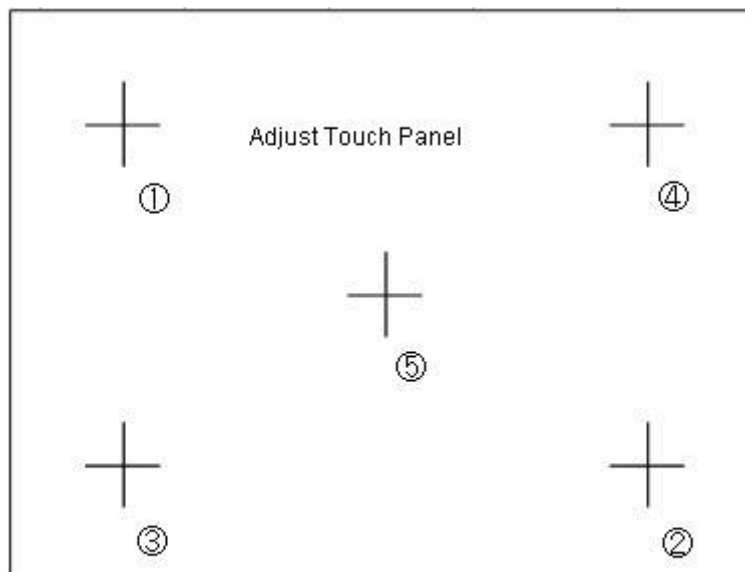
4.7 Adjustment of Touch Panel

4.7.1 Adjustment screen

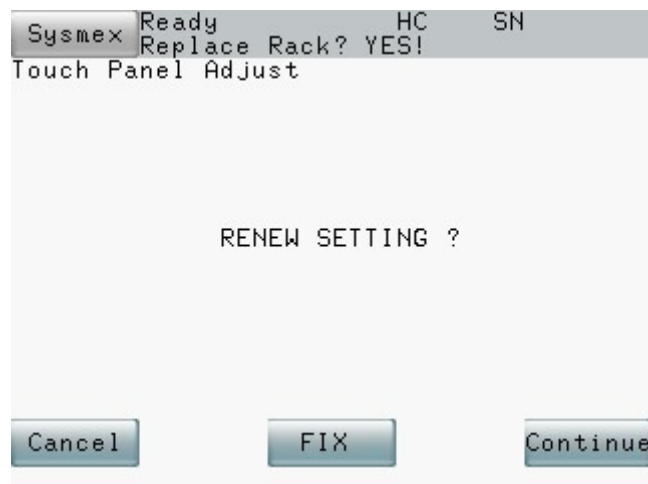
- (1) Verify that the ambient temperature where the unit is located is within the range of 15°C ~ 35°C.
(The optimum recommended temperature range is 25°C ±3°C.)
- (2) Start Service Mode.
- (3) Select [Special Operate] - [Service] - [Adjust] - [Touch Panel Adjust].
- (4) Adjustment screen for touch panel appears.



- (5) Select [Set] key.
- (6) Press the center of the cross-shape for more than 1 second by the order of (1)-(5) described in the picture below.



- (7) The following screen appears after pressing the (5) cross-shape.



(8) Updated adjustment data for touch panel is printed out when pressing [Fix] key, and returns to [Adjustment] screen.

CAUTION:

If the adjustment fails, the following screen appears.
Press [Confirm] key to perform adjustment once again.

